

Attachment 2

Oil and Hazardous
Materials/Technical Assistance Data
System

Americium-241

144349



000002

AMERICIUM 241

OHM/TADS - Oil and Hazardous Materials/Technical Assistance Data System

Developed by the Office of Water and Waste Management of the United States Environmental Protection Agency. 1985.

Document Outline

- 1.0 SUBSTANCES INCLUDED
- 3.0 TRANSPORT/STORAGE/HANDLING
- 4.0 LABORATORY
- 5.0 PHYSICOCHEMICAL PARAMETERS
- 6.0 FIRE/EXPLOSION/CORROSION HAZARDS
- 7.0 ENVIRONMENTAL HAZARDS
- 8.0 RANGE OF TOXICITY
- 9.0 HUMAN HEALTH HAZARDS
- 10.0 CLEANUP PROCEDURES
- 11.0 DATA ADEQUACY EVALUATION

SUBSTANCES INCLUDED

Material name: AMERICIUM 241

CAS number: 14596-10-2

Chemical formula: AM

Tradename(s):

Production sites: AMERSHAM/SEARLE CORP., ARLINGTON HGTS, IL; BIONUCLEAR, HOUSTON, TX; CAPINTEC NUCLEAR, MT; VERNON, NY; EBERLINE INSTRUMENT CORP., SANTA FE, N.M. GENERAL ELECTRIC CO. (IRRADIATION PROCESS. OP.), PLEASANTON, CA; GENERAL NUCLEAR, INC., HOUSTON, TX; HIGH VOLTAGE ENGINEERING CORP., BURLINGTON, MA; INTERNATIONAL CHEMICAL AND NUCLEAR CORP., IRVINE, CA; ISOTOPE PRODUCTS LABORATORIES, BURBANK, CA; MONSANTO RESEARCH CORP., DAYTON, OH; NATIONAL BUREAU OF STANDARDS, WA; DC; NEW ENGLAND NUCLEAR CORP., BOSTON, MA; NUCLEAR ASSOCIATES, INC., WESTBURY, NY; NUCLEAR EQUIPMENT CHEMICAL CORP., FARMINGDALE, NY; NUCLEAR MATERIALS AND EQUIPMENT CORP., PITTSBURGH, PA; NUCLEAR RADIATION DEVELOPMENTS, INC., BRAND ISLAND, NY; NUCLEAR SUPPLIES, ENCINO, CA; ORTEC, INC., OAK RIDGE, TN; PARKWELL LABORATORIES, INC., CROTON, OH; RADIATION MATERIALS CORP., WALTHAM, MA; SWISS FEDERAL INSTITUTE FOR REACTOR RESEARCH TELEDYNE ISOTOPES, PALO ALTO, CA; TRACERLAB, WALTHAM, MA; UNIVERSAL RADIOISOTOPES, INC., RICHMOND, CA.

TRANSPORT/STORAGE/HANDLING

Handling:

General handling procedures: CFR TRANSPORT GROUP 1 - TYPE A MAX QUANTITY .0001 CI AND TYPE B MAX QUANTITY 20 CI; TYPE A QUANTITY MAY BE PACKAGED FOR SHIPMENT VIA AIR, HIGHWAY, RAIL, AND WATER IN FIBERBOARD BOXES AND DRUMS, METAL DRUMS AND WOODEN BOXES; TYPE B QUANTITY IN METAL DRUM. THE TOTAL CONTENT OF RADIOACTIVE MATERIAL DOES NOT EXCEED .0001 CI PER DEVICE OR .001 CI PER PACKAGE FOR MANUFACTURED ARTICLES HAVING RADIOACTIVE MATERIALS OTHER THAN LIQUIDS IN NONDISPERSIBLE FORM.

000003

LABORATORY

Field detection limits (ppm): 3.E-5,GAMMA, BNW,

Laboratory detection limits (ppm): LESS THAN MPC IN WATER, GROSS ALPHA AND GROSS BETA COUNTING SAMPLE MAY REQUIRE CONCENTRATION BY DISTILLATION OR OTHER MEANS, (BNW C16)

PHYSICOCHEMICAL PARAMETERS

Physical parameters:

Location/state of material: 1. PURE ELEMENT IS SILVERY IN APPEARANCE 2. ALL COMPOUNDS EXCEPT AMF3 ARE SOLUBLE IN WATER WILL DISSOLVE

Boiling point (degrees C): 26

FIRE/EXPLOSION/CORROSION HAZARDS

Fire hazard:

Standard codes: LABELS FOR PACKAGES OF RADIOACTIVE MATERIALS MUST BE OF DIAMOND SHAPE, IN COLORS SPECIFIED, WITH EACH SIDE AT LEAST 4 INCHES LONG. PRINTING MUST BE IN BLACK INSIDE A BLACK LINE BORDER MEASURING AT LEAST 3 1/2 INCHES ON EACH SIDE. "RADIOACTIVE WHITE-I" LABEL -- LABEL MUST BE WHITE IN COLOR. THE SINGLE VERTICAL BAR ON THE LOWER HALF OF THE LABEL MUST BE BRIGHT RED IN COLOR. LABELS MUST BE APPLIED ON TWO OPPOSITE SIDES OF EACH PACKAGE HAVING A DOSE RATE NOT EXCEEDING .5 MILLIREM PER HOUR AT ANY POINT ON THE EXTERNAL SURFACE OF THE PACKAGE. NOT AUTHORIZED FOR FISSILE CLASS II PACKAGES. "RADIOACTIVE YELLOW- II" LABEL -- THE UPPER HALF OF THE LABEL MUST BE BRIGHT YELLOW AND THE BOTTOM HALF MUST BE WHITE. THE TWO VERTICAL BARS ON THE LOWER HALF OF THE LABEL MUST BE BRIGHT RED IN COLOR. LABELS MUST BE APPLIED ON TWO OPPOSITE SIDES OF: A) EACH PACKAGE HAVING A DOSE RATE NOT EXCEEDING 10 MILLIREM PER HOUR AT ANY POINT ON THE EXTERNAL SURFACE OF THE PACKAGE AND NOT EXCEEDING .5 MILLIREM PER HOUR AT 3 FEET FROM THE EXTERNAL SURFACE OF THE PACKAGE; OR B) EACH PACKAGE FOR WHICH THE TRANSPORT INDEX DOES NOT EXCEED .5 AT ANY TIME DURING TRANSPORTATION. "RADIOACTIVE YELLOW-III" LABEL -- THE UPPER HALF OF THE LABEL MUST BE BRIGHT YELLOW AND THE BOTTOM HALF MUST BE WHITE. THE THREE VERTICAL BARS ON THE LOWER HALF OF THE LABEL MUST BE BRIGHT RED IN COLOR. LABELS MUST BE APPLIED ON TWO OPPOSITE SIDES OF: A) EACH PACKAGE HAVING A SURFACE DOSE RATE EXCEEDING 10 MILLIREM PER HOUR; B) EACH FISSILE CLASS III PACKAGE; C) EACH PACKAGE CONTAINING A LARGE QUANTITY OF RADIOACTIVE MATERIAL AS: 20 CURIES OF GROUP I RADIONUCLIDES, 20 CURIES OF GROUP II RADIONUCLIDES, 200 CURIES OF GROUP III RADIONUCLIDES, 200 CURIES OF GROUP IV RADIONUCLIDES, 5,000 CURIES OF GROUP V RADIONUCLIDES, 50,000 CURIES OF GROUP VI RADIONUCLIDES, 500,000 CURIES OF GROUP VII RADIONUCLIDES, OR 5,000 CURIES OF SPECIAL FORM RADIOACTIVE MATERIALS; OR D) EACH PACKAGE TRANSPORTED UNDER A SPECIAL PERMIT ISSUED IN RESPONSE TO A PETITION.

Toxic combustion products: RADIOACTIVE COMBUSTION PRODUCTS

Personnel protection: ALPHA, GAMMA RADIATION. DO NOT ALLOW CONTAMINATED WATER TO COME IN CONTACT WITH SKIN OR PERSONAL CLOTHING. WEAR WATERPROOF PROTECTION. IF THE RADIOACTIVITY IS ALSO AIRBORNE, A MASK WITH AIR FILTER MAY BE REQUIRED.

Explosion hazard:

Explosiveness: NONFISSIONABLE

000004

ENVIRONMENTAL HAZARDS**Pollution hazard:****Water pollution:**

Persistency: 458 YEAR RADIOACTIVE HALF-LIFE; 20,000 DAY BIOLOGICAL HALF-LIFE IN TOTAL BODY, 73000 DAYS IN BONE, 24000 DAYS IN KIDNEYS, AND 3000 DAYS IN LIVER

Effect on water treatment process: 1. POSSIBILITY OF BUILD-UP OF RADIOACTIVITY IN WATER TREATMENT SLUDGE OR FILTERS 2. POSSIBILITY OF BUILD-UP OF RADIOACTIVITY IN SEWAGE TREATMENT SLUDGE 3. POSSIBLE TOXIC EFFECT ON SEWAGE TREATMENT BACTERIA.

Water uses threatened: ALL WATER USES

Industrial fouling potential: THE SAFE RADIATION LEVELS ARE BELOW INDUSTRIAL FOULING POTENTIAL LEVELS.

Air pollution: RADIOACTIVE HIGH**Food chain:**

Potential for accumulation: THE CONCENTRATION OF RADIONUCLIDES IN AQUATIC AND MARINE ORGANISMS IS GOVERNED BY THESE FACTORS: 1) THE PARTICULAR ELEMENT INVOLVED AND ITS PHYSIOLOGICAL IMPORTANCE TO THE ORGANISM 2) THE PHYSICAL AND CHEMICAL STATE OF THE ELEMENT AND ITS POTENTIAL; ACCEPTABILITY TO THE SPECIFIC ORGANISM 3) THE CONCENTRATION OF THE ELEMENT IN THE ENVIRONMENT AND THE PRESENCE OF OTHER ELEMENTS THAT MAY INHIBIT OR ENHANCE ITS UPTAKE 4) THE MORPHOLOGY OF THE ORGANISM, ITS LIFE HISTORY, ITS CONDITION AND AGE, AND ITS PARTICULAR ROLE IN THE FOOD WEB AND 5) THE PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE ENVIRONMENT.

Aquatic toxicity:**Freshwater toxicity text (Conc. in ppm):**

Conc.	Expos (Hr)	Specie	Effect	Test Environment
8000		ALGAE	TLM	
25000		ALGAE	100%	
			MORTAL	
			ITY	
10000		PROTOZOA	TLM	
18000		PROTOZOA	100%	
			MORTAL	
			ITY	
5000		MOLLUSKS	TLM	
10000		MOLLUSKS	100%	
			MORTAL	
			ITY	
500		CRUSTACEA	TLM	
5000		CRUSTACEA	100%	
			MORTAL	
			ITY	
600		FISH	TLM	
2500	1344	RAINBOW TROUT	ALL	
			KILLED	

Toxicity to animals:**Animal toxicity text (Value in mg of material/kg body wt):**

000005

Value	Time	Species	Param.	Route
1400	10	DOG	LD50	
	R/DAY			
	6			
	DAY/W			
	EEK			
3500	10	RAT	LD50	
	R/DAY			
	6			
	DAY/W			
	EEK			
4400	8.8	MUS	LD50	
	R/DAY			
2300	8.8	GPG	LD50	
	R/DAY			

Livestock toxicity (ppm): 200

RANGE OF TOXICITY

Inhalation limit: 2.E-13

Inhalation limit text: (UC/CC)

Irritation levels: .00004

Irrigation levels text: UC/CC

Direct contact: REFER TO SPECIFIC COMPOUND

Direct human ingestion (mg/kgwt): 2280

Drinking water limits (ppm): .000004 .000004

HUMAN HEALTH HAZARDS

Acute hazard level: SOLUBLE: ORGAN OF REFERENCE MAXIMUM PERMISSIBLE 40 HOUR WEEK BURDEN IN TOTAL UCI/CM3 BODY(9), UCI MPC AIR, MPC WATER KIDNEY / .1 / 6.E-12/ 1.E-4 BONE / .05 / 6.E-12/1.E-4 LIVER / .4 / 9.E-12/2.E-4 TOTAL BODY / .3 / 2.E-11/2.E-4 GASTROINTESTINAL TRACT/ 0 / 2.E-7/ 8.E-4 INSOLUBLE: ORGAN OF REFERENCE MPC/W MPC/A LUNG / /10-10 GASTROINTESTINAL TRACT/ 8.E-4 /10-7

Public health hazard: HIGH, DUE TO EXPOSURE TO RADIATION

Action levels: NOTIFY LOCAL AIR AUTHORITIES AND THE NUCLEAR REGULATORY COMMISSION. DO NOT ENTER AREA WITHOUT RADIATION MONITORING EQUIPMENT.

Carcinogenicity: IONIZING RADIATION HAS THE POTENTIAL FOR BEING CARCINOGENIC.

Mutagenicity: EXPOSURE OF SEX CELLS TO IONIZING RADIATION CAN CAUSE GENE MUTATIONS TO OCCUR IN EXCESS OF THE SPONTANEOUS MUTATION RATE. POTENTIAL.

Teratogenicity: DEVELOPMENTAL DEFECTS HAVE BEEN OBSERVED IN EXPERIMENTAL ANIMALS EXPOSED TO IONIZING RADIATION. POTENTIAL.

CLEANUP PROCEDURES

In situ amelioration: 1. CATION EXCHANGE RESIN 2. LIME TREATMENT PLUS COAGULANT. SEEK PROFESSIONAL ENVIRONMENTAL ENGINEERING ASSISTANCE THROUGH EPA'S ENVIRONMENTAL RESPONSE TEAM (ERT), EDISON, NJ, 24-HOUR NO. 201-321-6660.

Beach/shore restoration: REMOVE THE SAND AND BURY AT AUTHORIZED BURIAL SITE.

Countermeasure material availability: CATION EXCHANGE RESIN - WATER SOFTENING AND CONDITIONING SUPPLIERS, WATER TREATMENT PLANTS; LIME - CEMENT PLANTS; COAGULANTS SUCH AS ALUMINUM SULFATE OR FERRIC SULFATE - WATER TREATMENT PLANTS

Disposal method(s): BURIAL AT AN AUTHORIZED RADIOACTIVE DISPOSAL SITE

000006

000006

6/13/00 4:30 PM

Disposal notification(s): CONTACT THE NUCLEAR REGULATORY COMMISSION.

DATA ADEQUACY EVALUATION

GOOD

000007